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HOSPITAL BUILDING NOTE

LAUNDRY

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Laundry

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An addendum to Appendix E of Hospital Building Note No. 2, *The Cost of Hospital Buildings*, which sets out cost recommendations for the Laundry, is supplied with this Building Note.

I. Scope

1. This Building Note gives guidance on the design of laundries to deal with between 45,000 and 110,000 articles a week. It does not cover laundries in which patients assist the laundry staff, and which do not use the highly productive and mechanised equipment described in this Note.

2. Prior to the introduction of automatic and mechanised aids, laundries in this country conformed to a fairly standard and rather narrow pattern. The introduction in recent years of new types of machines and, very recently new washing systems, has greatly widened the choice of layout and design but at the same time has imposed certain limitations. The types of machines included in this Note provide economical and reliable operation and at the same time meet the medical requirement of separting the soiled side of the laundry from the remainder (as recommended in the Central Health Services Council's Report " Hospital Laundry Arrangements ").

3. Some of the newer washing machines have been deliberately omitted because, generally speaking, they have not yet fully proved their reliability. Moreover, in some instances, the washing systems do not satisfy medical requirements. It is realised that, because of the modifications and intensive development in machine designs now being made, further advice will be required. These developments are being investigated and further information will be issued as necessary.

II. General considerations

4. Most hospital laundries serve more than one hospital. The closing of small, uneconomic laundries and the concentration of work into larger, well-designed and efficiently run group laundries have almost without exception resulted in marked savings in running costs. The possibility of centralising laundry services on a group or, in some cases, on an inter-group basis should therefore be investigated when a new laundry is being planned. The possibility of joint use by teaching and non-teaching hospitals should not be overlooked if this would produce an economic unit.

5. If laundry services are provided on a group or inter-group basis, it is usually an advantage for the laundry to be sited near the largest user and the central sterile supply department. There may be other over-riding considerations, however, such as the availability of labour or the type of locality. In some instances the laundry may not be on a hospital site at all, though there must in all cases be a good and reliable steam supply available.

6. The laundry, as a major heat user, should be sited near the boiler plant. It should have easy access to the main service roads of the hospital and, where much of the work is undertaken for " sending " hospitals, public roads as well.

7. There is much to be said for the laundry being on one floor level but there may be advantage, especially on sloping sites, in putting the despatch department at a lower level and having a mezzanine floor over the wash-house for classifying incoming soiled linen. The latter arrangement is well suited to certain types of the newer washing machines in that they can be loaded quickly from above, with consequent increase in output.

8. The productive area of the laundry should have a clear floor area free of structural supports. This will avoid obstructions in the work-flow and restrictions in the siting of plant, both in the initial stage and when replacement is necessary.

9. In view of the present tendency for laundry demands of hospitals to increase, it is important that the basic structural design should be such as to allow extension, if necessary. The need, if any, will be for lateral extension of the productive area.

10. A building of light construction, having a clear head-room of 14 feet, is suitable for the main working area. The ancillary accommodation needs a clear height of 8 feet (see recommendations on preferred vertical dimensions in Design Note No. 1 on Dimensional Co-ordination and Industrialised Building). The roof should be designed to minimise dust-collecting surfaces.

11. The buildings should be designed to meet the requirements of the Factories Acts, 1961, Electricity (Factories Act) Special Regulations 1908 and 1944, Electricity Supply Regulations, 1937, in so far as they apply to laundries, and also of the Thermal Insulation (Industrial Buildings) Act, 1957.

12. The measure of laundry capacity used in this Building Note is " articles weekly ". The dry weight per article is assumed to average 0·7 lbs. Because of the difference in make-up of work (even in hospitals

of similar type) the average weight per article will, however, vary between one hospital and another. In assessing what laundry facilities should be provided for a given quantity of work expressed in " articles " the weight and make-up should therefore be considered.

13. If information regarding the anticipated articles per staffed bed is not available, the following estimates will serve as a guide. (In cases where known demands are in excess of these quantities, authorities should satisfy themselves that there is no excessive use of clean linen.)

Type of bed	*Articles weekly per staffed bed (approx.)*
Acute (teaching and very large district general hospital)	60–70 at 0·7 lb. per article
Acute and mainly acute	60 at 0·75 lb. per article
Chronic	30–40 at 0·8 lb. per article
Psychiatric	20 at 0·9 lb. per article
Maternity	110 at 0·5 lb. per article

NOTE: These figures will be affected if disposables are used to any great extent.

III. List of spaces and rooms

A. Basic accommodation

14. This will be required in all cases and should consist of the following:

(*a*) *Productive area*
- (i) Reception, sorting and classifying
- (ii) Wash area
- (iii) Calendering, drying and pressing
- (iv) Assembling, packing and despatch

(*b*) *Staff lavatories and changing rooms*

(*c*) *Barrier rooms*

(*d*) *Mess-room*

(*e*) *Rest room*

(*f*) *Offices*

(*g*) *Laundry stores—washing materials and machine clothing*

(*h*) *Electrical switch room*

(*i*) *Calorifier and plant room*

(*j*) *Cleaners' room*

(*k*) *Circulation space for* (*b*) *to* (*j*) *above*

(*l*) *Space for header tank*

Functional unit

15. The functional unit selected for the basic accommodation in this Note and the related Cost Note (supplied herewith as an addendum to Appendix E of Building Note No. 2) is the installed capacity of the plant expressed in multiples of 1,000 articles laundered weekly (42 hours).

B. Additional accommodation

16. Additional accommodation which may be required in some instances may include:

(*a*) *Foul sluice room*

(*b*) *Infants' napkin section*

(*c*) *Main linen store*

(*d*) *Repair room for linen*

(*e*) *Water softening plant room*

(*f*) *Engineers' store*

(*g*) *Dry-cleaning room*

IV. Description of spaces and rooms

A. Basic accommodation

17. Appendix I gives a table of areas recommended for each space or room in five laundries of different capacity—45,000, 60,000, 75,000, 90,000 and 110,000 articles weekly. As a rule, the more economic laundries are in the range 55,000 to 110,000 articles weekly, but guidance is included for one of 45,000 articles weekly because, even on an inter-group basis, there are some areas where the total work dealt with could not exceed this figure without incurring excessive transport costs.

(a) Productive area

18. The main element in the basic accommodation is the " productive area " of the laundry. This comprises the following sections:
- (i) *reception, sorting and classifying;*
- (ii) *wash area;*
- (iii) *calendering, drying and pressing;*
- (iv) *Assembling, packing and despatch.*

19. These sections must be considered together to ensures that the design facilitates the easy flow of articles along the production line from reception to despatch. On reception at the laundry, articles are sorted and classified according to the washing, reassembling and other processes employed. There are usually two main flow-streams—one for staff articles and one for ward and other articles. After washing, staff articles are finished mainly by pressing, then racked, and subsequently packed in individual bundles or boxes. Ward articles, etc., after washing.

are dealt with mainly by calendering (for sheets and other flat work) or drying (for bath towels, cotton blankets, etc.): they are then re-assembled according to type, or in some cases destination, prior to being packed for despatch. If a central linen store is provided within or adjoining the laundry, ward articles will be transferred to the linen store racks immediately after being calendered or dried. Otherwise, the re-assembling and packing of the clean articles will be undertaken in the packing department. An alternative to the latter arrangement that is sometimes used is to pack bed linen on the delivery side of the flat-work ironing machine.

20. The general flow of work is shown in Figure 1.

21. The design of the building and the layout should allow complete physical separation of the soiled side of the area from the remainder, either by the provision of a mezzanine floor or barrier partition or both (see Figures 1 and 2). The barrier partition should have glazed viewing panels at working level and should extend to roof height. The wash areas should be physically divided to provide dirty and clean sides: this is now possible due to the advent of specially designed washing machines (see paragraph 56). On the dirty side the reception, sorting and classifying section will not normally be physically separated from the dirty side of the wash area. On the clean side, the calendering, drying and pressing sections will be distinct areas but not physically separated from each other or from the clean side of the wash area. Physical separation of these sections from the packing and despatch section will generally be unnecessary. Layout diagrams are given in Figures 3–7.

22. It is not normally necessary to provide an unloading dock, or ramp, for the reception of soiled linen. An overhead mono-rail system (see paragraph 70) for conveying the soiled linen bags from the vans to the classifying tables has many advantages, including economy of labour in unloading the vans. Where overhead mono-rail systems for soiled linen are employed, the structure should be designed for the rails to be hung from the roof. If the nylon sling/electric hoist system is employed for mechanically loading the hydro-extractor (see paragraph 71) the gantry can be supported by columns rather than being hung from the roof. An unloading dock can usually be provided with advantage for the despatch of clean linen, especially on sloping sites. External canopies should be provided over reception and despatch areas. Adequate turning space for vans to unload and load is essential.

23. Where a linen store is provided within the laundry, it should be fully enclosed for security reasons.

24. Provision should be made for the easy intake or removal of plant either by doors or removable panels (8 ft. wide by 9 ft. high) into the productive area or by way of the reception and despatch doors.

25. The productive area should be provided with good natural lighting, avoiding direct sunlight. Consideration should be given to the use of rubber flap doors for the reduction of cold draughts. A small amount of space heating is necessary in cold weather for parts of the laundry where there is no washing and processing plant radiating heat, but the main requirement is rather the provision of cool, comfortable working conditions. Generally this is achieved by designing the building for adequate natural cross-ventilation and removing vitiated air at high level with an inflow of fresh air at low level—this is dealt with more fully under " Ventilation ".

26. Floor finishes in the productive area should be hard wearing, non-slip and easily cleaned. In the case of the wash area they should be non-slip when wet.

(*b*) *Staff lavatories and changing rooms*

27. Separating changing rooms for male and female staff with clothes lockers and sanitary accommodation (w.c's. and lavatory basins) should be provided near the staff entrance. Sanitary facilities for each sex are required on the following basis:

Male	*Laundry capacity (in articles weekly)*
1 w.c., 1 urinal, 1 lavatory basin	45,000, 60,000, 75,000
2 w.c's., 1 urinal, 2 lavatory basins	90,000, 110,000
Female	
3 w.c.'s, 3 lavatory basins	45,000, 60,000
4 w.c's, 4 lavatory basins	75,000, 90,000
5 w.c's., 5 lavatory basins	110,000

These are in addition to the w.c. and lavatory basin in each barrier room. An incinerator should be provided in each group of female lavatories.

(*c*) *Barrier rooms*

28. The movement of staff from the soiled side of the laundry to other parts of the laundry (mess-rooms, etc.) constitutes an infection risk if suitable precautions are not taken. Male and female barrier rooms are therefore required. Each should have self-closing doors and should include a minimum of one w.c. and lavatory basin and lockers for protective clothing for the few staff working on the soiled side. It will not be necessary to provide showers in the barrier rooms.

(*d*) *Mess-room*

29. This should be easily accessible from the working area and, unless there is adequate alternative accommodation nearby, should be designed to accommodate at least half the total staff at one sitting. Facilities for heating meals and making hot drinks should be provided. There should also be wash-up facilities, drinking water and a small cupboard for crockery, etc.

(e) Rest room

30. A small room should be provided for the use of female staff. It should be designed to accommodate one person for laundries up to 75,000 articles weekly, and two persons for laundries above that size.

(f) Offices

31. Offices should be adjacent to each other. The laundry manager should have a separate office and it is desirable that this should be sited so that the whole of the clean side of the laundry can be seen when in operation.

(g) Laundry stores

32. The *washing materials store* should be near the wash-area at the soiled linen side. Storage space for at least one week's supply should be provided. Additional storage will be necessary for bulk purchase items but this may be located away from the laundry.

33. The *machine clothing store* should preferably be near the calenders and presses; easy unloading from outside transport is desirable. This store should be large enough to accommodate materials for completely re-clothing the calenders, and several months' supply for the presses.

34. Dry conditions should be provided for both stores.

(h) Electrical switch-room

35. This room should be designed in accordance with the Factories Acts, 1961, Memorandum on the Electricity Regulations (H.M.S.O.), to allow a clear passage in front of the switchgear (which may be wall-mounted or free standing). The recommended size is 8–10 ft. long with a minimum width of 5 ft. and a height of 8 ft., but this will depend on the type of equipment installed. It should be kept dry and well ventilated and the door should be fitted with a lock.

(i) Calorifier and plant room

36. This room should be used for the steam main entry to the laundry from the boiler house, and for steam meters and headers with reducing set for low pressure steam services to the wash-area. It should be sited near the centre of the steam load for the laundry in order to minimise the lengths of piping. The room should be big enough to acommodate the hot water storage calorifiers where central hot water service is not available. It should also house the air compressor(s) and receiver(s) which are used in conjunction with the presses, etc.

37. All steam and condense piping and the hot water cylinders should be adequately lagged. The room should have adequate permanent ventilation with low level inlet grilles or louvres and high level outlets. Entry should preferably be from the outside of the building. Sufficient clear space should be allowed around each item of equipment to facilitate maintenance and servicing. Guidance on the capacity of the plant to be installed is given in Appendix III—Service requirements.

(j) Cleaners' room

38. A cleaners' room is required, with a bucket sink with hot and cold water, drainer, locker, and space for mechanical cleaning equipment, cleaning utensils, etc.

(k) Circulation space for (b) to (j) above

39 Corridors should be well lit and ventilated.

(l) Space for header tank

40. A header tank containing approximately 1 hour's storage will be required to supply the washing machines. This tank may be supported by a structure above the water-softening plant or alternatively be situated in a convenient position above the washing machines. The areas recommended in Appendix I for the header tank refer to the nominal areas of a tank of 4 ft. in depth.

B. Additional accommodation

(a) Foul sluice room

41. It will not normally be necessary to provide a foul sluice room, but if the amount of foul linen from the parent hospital is considerable (exceeding 2,500 articles daily) it may be preferable for foul sluice facilities—washing machines or mechanical sluicers, or both—to be installed in a separate section of the wash-house or adjacent to it, instead of having an outside sluice point equipped with mechanical sluicers as described in the Central Health Services Council's Report, "Hospital Laundry Arrangements".

42. The foul washing machines, for sluicing only, will be operated by laundry staff during working hours, and the mechanical sluicers by other staff during the hours when the laundry is closed. With this arrangement, access to the mechanical sluicers (but not to other plant) during the non-working laundry hours is necessary. For mechanical sluicers and foul washing machines, connection to sealed drainage is necessary; open drainage will also be required to allow frequent hosing down of the floor.

43. The arrangement of the sluice room described in the previous paragraph is illustrated in Figure 7, for a laundry handling 110,000 articles weekly. Similar arrangements could, if necessary, be introduced in the layouts illustrated on the other figures.

44. The alternative is to provide a "sluice point", equipped with mechanical sluicing facilities at the parent as well as the "sending" hospitals. For the parent hospital the "sluice point" should be near the laundry, so that advantage can be taken of common water and other services.

(*b*) *Infants' napkin section*

45. A separate infants' napkin section is not normally justified where less than 8,000/10,000 napkins are to be dealt with weekly.

46. Where there is not a separate section, the napkins have to be handled in the main wash-area, and the provision of a special washing machine for them should be considered. The outlet of the washing machines used for infants' napkins should be connected to sealed drainage.

(*c*) *Main linen store*

47. A main linen store may be provided for the parent hospital within the laundry (normal packing arrangements are necessary for the clean linen from the "sending" hospitals): alternatively this accommodation can be provided with the central supply department of the hospital. With the former arrangement clean linen can be placed on the linen store racks direct from the finishing plant, with consequent staff economy in avoiding double handling. To accommodate a main linen store, additional floor space in the packing and despatch section of the laundry will be required. As a guide, 17 sq. ft. for every 1,000 linen store articles handled weekly should be allowed.

(*d*) *Repair room for linen*

48. This will be needed if the examination and repair of articles is to be done within the laundry. This room should be partitioned to separate it from the productive area. An indication of the minimum accommodation required is given in Appendix I. This is on the basis of one seamstress for every 40,000 articles laundered per week and 65 sq. ft. for one sewing machine or 50 sq. ft. per machine for two machines or more. Modifications may be necessary in the light of the precise requirements.

(*e*) *Water softening plant room*

49. If soft water of less than 4 to 6 degrees Clarke's hardness is not available, it is advisable to install water softening plant, generally of the base exchange type to give water of zero hardness. This plant usually comprises a break tank, water-softener, brine tank, sump and drain. Soft water storage tanks (containing not less than half a day's storage), in addition to the header tank containing approximately one hour's storage, complete with pumps, will be required to supply the washing machines. (See Section VI—Hot, cold and drinking water services.)

50. It is common practice now to locate the larger soft water tanks at or below ground level, but where the tanks providing water storage for the laundry are supported by a tower to give the necessary pressure head, it is, in some circumstances, satisfactory for "base-exchange" water softening plant to be accommodated beneath these tanks.

51. Where the "base-exchange" system is used, space may also be required to store the bulk supplies of dry salt. This requires approximately 80 sq. ft. for a quantity of 7 tons. Alternatively, salt slurry may be delivered by road tankers in 7-ton loads, in which case a specially lined storage tank will be necessary. The salt is normally pumped into the storage tank by the tanker, and the hose may be up to 90 ft. in length.

52. The water softening process can be either manual or automatic in operation. Both systems require approximately the same area. If manual operation is preferred, it is recommended that it should be regenerated daily, preferably after working hours.

(*f*) *Engineers' store*

53. This store should contain a work-bench with small tools, and racks to hold small fittings. Cupboards should be provided below the bench.

(*g*) *Dry-cleaning room*

54. If dry-cleaning is to be undertaken it should be provided on an inter-group basis, in order that there will be sufficient work (generally not less than 2,500 lb. weekly) to keep the dry-cleaning equipment fully employed throughout the week. Good ventilation and natural lighting are essential. The dry-cleaning plant should be of the automatic "non-flam" enclosed type.

V. Laundry plant

(a) General requirements

55. The laundry plant should satisfy the requirements of the Factories Acts, and should be chosen in the light of the following broad considerations:

(i) *Suitability for its purpose, with special reference in the case of washing machines*

(*a*) to fulfilling medical requirements regarding cross-infection;

(*b*) to economy in the use of water, steam and washing materials

(ii) *Reasonable capital cost*

(iii) *Efficiency*

(iv) *Suitability for employing automatic and mechanised aids*

(v) *Robust construction*

(vi) *Ease of maintenance and removal.*

(b) Washing machine design

56. The development in recent years of the 100 lb. end-unloading washing machine and the direct electrically driven hydro-extractor of similar capacity, has made possible, at reasonable capital cost, an almost completely mechanised unit needing less manual labour than hitherto. With this type of machine it is now practicable to provide the complete separation of the laundry into two sections—soiled and clean—which is desirable from the medical aspect and recommended in the Central Health Services Council's Report " Hospital Laundry Arrangements ". Even more efficient washing systems are being developed for greater bulk handling, employing larger washing machines (with recovery plant for heat, water and washing materials) together with special extraction and tumbling plant. Modifications in the design are being made where necessary in order that these machines may comply with medical requirements on cross-infection. The performance of the newer washing systems will be kept under constant review and further advice will be issued as necessary.

(c) Specification

57. An indication of the main items of plant to be allowed initially for laundry capacities ranging from 45,000 to 110,000 articles weekly is given in Appendix II. A specification for these items is given below. Although the machines of the newer washing systems referred to above are not specified, they should not be excluded from consideration. The final choice of plant should be made in the light of the precise requirements for the particular project under consideration.

(i) *Washing machines*

58. Washing machines should be end-unloading with separate loading doors. They should be fitted with automatic washing controls and should preferably be suitable for forming part of a heat and water recovery unit system. They should be of stainless steel construction, especially if woollen blankets are to be dealt with by a special high temperature process in order to render them bacteriologically satisfactory.

(ii) *Hydro-extractors*

59. These should generally be direct, electrically driven, 36 ins. diameter machines, with a " g " factor of 1,070. They should be suitable for mechanical loading.

(iii) *Flat-work ironing machines (calenders)*

60. In recent years deep-bed machines of unit construction have been an outstanding feature of British laundry machinery development. The rolls are usually of 18 ins. to 24 ins. diameter and since they are not capable of " floating " (lifting) to the extent possible on earlier machines with smaller rollers, spring padding is usually fitted. Further aids to output are suction and/or high pressure steam for the rollers (normally supplied with low pressure steam) and " gap pieces " fitted between the beds. The deep-bed type of machine is reliable and efficient. It combines good output with high quality and requires little floor space. Its inclusion in this Note should not exclude consideration of other types of ironing machines, however, provided they are equally suitable and efficient.

(iv) *Drying plant*

61. Drying is now carried out mainly by dry tumbling. This equipment occupies less floor space and requires less labour than the static drying plant which formerly was widely used. The latter, however, is more satisfactory for woollen articles (because of the reduced risk of shrinkage) and is recommended in the Joint Report of the International Wool Secretariat and the British Launderers Research Association " High temperature laundering of woollen hospital blankets ". The decision, therefore, whether or not to include static drying plant, should be made in the light of the specific drying requirements, including the amount of woollen material to be dried and its susceptibility to shrinkage. Shrink resistant material will withstand tumbler drying more satisfactorily than untreated material and the case for employing static drying for such material is not a strong one. If static drying plant is not installed it is important to ensure that the drying tumblers include thermostatically controlled two-speed machines for use with woollens, to give a temperature lower than that required for cotton articles.

62. Tumbling plant, besides being used for completely drying terry towelling and other cotton articles, is used for conditioning flat articles for calendering (by breaking up the closely packed " cheeses " unloaded from the hydro-extractors). Two types are in general use, " drying tumblers " of conventional pattern and " shaking out " tumblers. It is advantageous, especially with heavy articles, to reduce the moisture content (usually 50 per cent. after extraction based on the " bone dry " weight) whilst the articles are being " shaken out " in the tumbler and for this the conventional drying tumbler has usually been preferred. Where little drying is required, the " shaking out " tumbler is usually used. But in either case the choice of tumbler should only be made after full consideration of the newer and generally larger types of machines being developed. Even if not completely self-loading and unloading they may still lend themselves more readily to mechanised operation than the older and more conventional machines.

(v) *Presses*

63. The types of presses commonly used in laundries have polished heads and are of the " scissors " pattern (the head closes; the buck is fixed) or the " rotating table " pattern (the head is fixed; the twin tables, or bucks, rotate). One " rotating table " press is roughly equal in output, on general work, to a pair of " scissors " presses. The " rotating table " type has been much more widely used in hospital laundries and is included in the plant schedule. But for specialised needs, e.g. the pressing of white coats, presses of different type may in some circumstances be more suitable. All types are operated by compressed air. The hand-ironing facilities required should be small but will depend on the material and design of the uniforms. (See the Central Health Services Council's Report " Design of Nurses' Uniforms ").

64. Where the number of pillow-slips to be dealt with is unusually large or the calender plant decided on is barely adequate for the flat-work demands, provision of a special pillow-slip press, although not included in the plant schedule, may be justified. The most modern design of pillow-slip press has means for pressing the articles on both sides (consecutively); preparing and feeding is carried out in one operation.

65. Occasionally there are sufficient woollen garments to justify the provision of a " Hoffman ", or valet press. This type has a padded head, and is of the " scissors " pattern, but manually operated. It is seldom in demand, however, and because the labour required for operating it is used to poor advantage, it is not included in the plant schedule.

(vi) *Starching machine and collar polishing machine*

66. Unless the collars and cuffs of the nursing staff are of the older type, with many thicknesses of material, there may only be a need for these machines in the larger laundries. The newer type of collar and cuff, consisting of one thickness of material, requires only very light starching and finishing.

(vii) *Automatic washing controls*

67. Of the numerous types of automatic washing controls available for washing machines, two have proved suitable in hospital laundries. One is a time-based control which is built into the machine but needs a constant head of water when rinsing: the other is usually mounted on a pedestal between washing machines and is operated mainly by volumetric control. Of the two the second is more comprehensive in action. For both types it is necessary for washing materials to be used in liquid form in special tanks. But the position of the tanks in relation to the machines is most important with regard to the head of detergent available in the case of the volumetric control type.

68. It is normally undesirable for machines to be loaded or unloaded together or at irregular intervals: in addition to the normal control there should therefore be a sequence control, governing the operation of all the washing machines, to ensure a constant delivery of linen at regular and frequent intervals.

69. A further control may be necessary if an overhead mono-rail system is used for conveying soiled linen to the washing machines. This is an automatic release to allow the soiled linen container to gravitate to the washing machine when the clean linen has been unloaded.

(viii) *Soiled linen conveyors*

70. An overhead mono-rail system can usually be used with advantage in a well-designed sorting room (*a*) for transporting the soiled linen (in bags) from the vans to the classifying tables, and (*b*) where a mezzanine floor sorting arrangement is not employed, for dispensing with trolleys for loading washing machines. Each case should be looked at on its merits but the use of such a system may considerably reduce the manual labour load both in the sorting room and in the loading of the washing machines. A weighing device should be provided to weigh out the dirty linen into suitable batches.

(ix) *Wet-work conveyors*

71. There are two satisfactory methods of substantially reducing the manual effort in loading hydro-extractors; (*a*) the nylon sling/electric hoist system, and (*b*) the flat-belt conveyor. The latter is the more widely used (probably because it was introduced earlier) but the choice should be determined in the light of the requirements in each case. An advantage of the nylon sling system is that its use can generally be extended to unloading the hydro-extractors and, subject to the machines being suitably sited, to transporting the hydroed work to the drying and shaking-out tumblers.

(x) *Flat-work preparation*

72. For efficient operation of the calender when large flat articles are fed at high speed, a fan-shaped " spreader " should be run in conjunction with it. Further large flat-work preparing equipment, working in conjunction with the spreader and the calender, is also advisable. Its main action, immediately the leading edge of the article is placed on the calender feed bands and held, is to remove creases and automatically control the feeding without further assistance from the operator. This equipment, which relies mainly on suction fans for its operation, fits closely to the riband feed and occupies little floor space.

73. Flat articles, other than large ones, will be dealt with on the second ironing machine in the larger laundries and should either be prepared manually and fed at high speed, or " shake " fed at relatively slow speed. The choice of method will be determined

largely by the amount of work handled and the make-up. If a high-speed machine is used for calendering flat articles other than large ones, ample space should be provided in front of the ironing machine for the necessary preparation. Special preparing equipment for small articles can in some cases be installed with advantage.

(xi) *Flat-work folding*

74. Because of the differences in the make-up of the articles between laundries, the folding equipment specified in the schedule should be regarded as a guide only. For those laundries in which two calenders are installed, a mechanical folder can usually be justified for each machine, one for the large flat articles, the other for the remainder. The mechanical folders which are most comprehensive in operation are made up to suit users' individual requirements. Details of the articles to be dealt with should be known before deciding what type of mechanical folding is required.

75. It will usually be desirable for the mechanical folder designed for the small articles to be capable of cross-folding as well. This arrangement can also be employed for large articles provided (*a*) examining for rejection or repair is done during preparation; or (*b*) rejection, where necessary, is done whilst feeding the calender, a finger-tip control being fitted at the feeding end to enable a sub-standard article to by-pass the folding mechanism at the other end.

76. Although not widely used in hospital laundries, there is an alternative method for mechanically folding small articles which is worth considering. This consists of a separate unit, operated (by one person) independently of the calender, which besides completely folding the articles, also stacks them. A guide bar usually directs the collecting of the small articles from the delivery end of the calender prior to their being transferred to this folding/stacking machine.

(xii) *Conveyors for press and other departments*

77. It is generally preferable to deliver articles to the presses by means of a flat-belt conveyor, and to take them away, when finished, on another similar conveyor sited vertically above the other. It may not always be convenient to make use of such an arrangement, however, and in such cases a sub-racking system, using special trolley racks, is a useful alternative. If flat-belt conveyors are used in the press room and in other finishing departments, it is important that they should not unduly restrict the movement of laundry staff.

78. A well-arranged flat-belt or gravity roller conveyor system can usually be used with advantage in the packing department for conveying the containers of clean linen to the despatch section, or to the vans.

(xiii) *Racking and packing*

79. There is little choice in the selection of racking equipment. Where the packing department is wide and not physically separated from the calender, press and drying sections, the use of revolving racks for the clean linen may sometimes be preferable to the use of more conventional racks. If the latter are used there is greater floor movement on the part of the staff in conveying work to and from racks less conveniently placed.

(xiv) *Ancillary equipment—mechanical sluicers*

80. If foul sluicing facilities are needed and, in addition to foul washing plant, mechanical sluicers are to be installed for dealing promptly with foul work during the hours when the laundry is closed (see paragraphs 41–44), the water requirements should, if possible, be provided from the cold water supply to the wash-house. Mechanical sluicers are generally in two sizes—12 lb. capacity and 25/30 lb. capacity. The former are capable of at least three loads per hour and require 90 gallons of water hourly; the latter are capable of three loads and require 230 gallons per hour.

(d) Foundations

81. Foundations for the machines may have to be sunk below the floor area. They should be in accordance with the makers' requirements having regard to the type and loading of the machine and the subsoil.

VI. Engineering services

82. Engineering services should be designed to ensure ease of maintenance with the minimum interruption of services. Meters for costing purposes should be installed for steam, hot and cold water, electricity and gas.

Mechanical services

Heating and ventilation

General requirements

83. The design of the heating system should be based on the following table of temperatures and ventilation rates, the outside temperature being assumed to be 30°F.

Accommodation	*Temperature*	*Air changes per hour*
Mess, rest, repair room for linen, changing rooms and offices	65°F	2
Linen store, packing and despatch areas, engineers' stores, barrier rooms, corridors and lavatories	60°F	2

Wash-area (soiled side), reception, sorting and classifying, foul sluice room	60°F	15/20 (extract)
Wash-area (clean side), calendering, drying and pressing	—	10/15
Dry cleaning	60°F	10
Laundry equipment stores ...	50°F	½

84. Fire protection of the building may influence the design of the engineering services, especially ventilation schemes. Due regard should, therefore, be given to these requirements in the early stage of planning.

Heating

85. The above conditions are normally met quite adequately by the use of low pressure steam convectors and unit heaters. Steam is available for laundry purposes and a system of this sort may be more easily installed than a low pressure hot water radiator system. The latter system may be used, however, if it is convenient.

86. In the wash-area (clean side), calendering, drying and pressing areas, there is considerable heat output from the machines and it is usually unnecessary to provide central heating.

87. Low speed low pressure steam unit heaters using external air may be placed near the entrance doors of the reception, sorting and classifying room, while those for the packing and despatch room may use re-circulated air to prevent cold draughts through open doors during unloading and loading operations.

88. Heating for frost protection purposes should be provided for lavatory accommodation, water-softening plant and foul sluice-room, etc., where freezing would otherwise occur in severe weather when the laundry is not in use.

Ventilation

89. The design of the building should provide good working conditions, largely without the need for mechanical extract ventilation. A few areas will be warmer than others, e.g. wash-areas, calendering and press departments, but this is unavoidable. Condensation is sometimes a problem but it should be possible to avoid this with adequate ventilation. It is necessary to provide for the inflow of fresh air at low level through adjustable louvres or hopper-type windows to ventilate the warmer areas and wash-areas. Roof-type extract ventilators may also be required. It may be desirable to fit suitable wire-mesh screens over high level windows and roof ventilators to keep out birds.

90. The number of air changes per hour recommended above may need to be modified if the layout, design and height of the particular building call for this.

91. The use of the low ventilation hoods over the calender(s) for the removal of steam formed when the articles are ironed is not recommended. They radiate heat and from the psychological aspect are open to criticism. The provision of suction rollers for the calender(s) considerably reduces the formation of steam, suction fans being fitted to draw it off. Ducts are required from these fans to discharge outside the building.

92. Normally tumblers take their supply of air from the room and discharge outside the building through duct work at high level. The outlet vent(s) should give protection against wind and rain, but should not restrict the air discharge.

93. Simple mechanical extract arrangements will be required at low level in the dry-cleaning room to remove fumes of perchlorethylene (or trichlorethylene) to the exterior of the building. Air inlets may be provided behind the heating convectors, or alternatively, at high level on the opposite side of the room. A ventilation rate of 10 air changes per hour should normally be adequate.

94. The provision of natural roof ventilation should normally give satisfactory results for the foul-sluice room but it may in some circumstances be necessary to provide a mechanical roof extractor fan unit.

95. Internal rooms and internal lavatories will need mechanical extract ventilation.

96. Mechanical ventilation will give disappointing results unless it is well designed and the extract fans carefully positioned. Mechanical roof-type extractor units may be used with advantage above the calendering and press sections for the efficient removal of heat and vitiated air near to the source. They should be made of anti-corrosive material, and be of unobtrusive design to fit snugly to the roof, " weather-proof " and fitted with remote controlled manually operated dampers for adjustment and closing off at night and in the winter.

97. Roof-type extractor fan units should be individually switched and have a red indicating light to show when the fan is running. The control switches/regulators should be conveniently placed in the calendering section. The fan motors should be of a continuous-rated " weather-proof " type. If special " inflow " units are to be provided (e.g. when the laundry is adjacent to the boiler house) they should be arranged to draw in air from the cooler side of the roof.

98. With a light roof structure (e.g. asbestos corrugated sheet) there are advantages if the mechanical roof extract units can be serviced from inside the laundry.

Steam service

99. The steam supply is normally taken from the

main hospital boiler house. The pressure should be not less than 100 p.s.i. at the laundry and the steam should be as dry as possible. A reduced pressure steam supply will be required for the washing machines. A steam meter will be required, and the pipe arrangement should be suitable for the necessary straight pipe length, orifice plate, flanges, etc.

Hot, cold and drinking water services

Cold water

100. A separate mains supply of cold water will often be required. Soft water storage will be required where water softening plant is installed (see paragraph 49). In addition raw water storage may be required and this will need to be determined in the light of water storage elsewhere in the hospital. It is important that the high flow rates to the machines over very short periods are not less than that shown in the table of "service requirements" (Appendix III). Some washing machines of recent design incorporate a "heat and water reclamation unit" (complete with small water tank) which consequently reduces the water demand. Water supply from the cold water storage tank will also be required for the mess-room sink, lavatory basins, and for the foul sluice room. Normal pillar taps should be provided for lavatory basins and sinks. A small supply of water may be required for the damping of articles at the presses. This is used in conjunction with the compressed air to give an atomised spray; alternatively condensate may be used (see paragraph 103). A hosing-down point with water at suitable pressure will be required in the main wash areas and foul sluice room. Where pipes at high level pass through warm areas it is recommended they be suitably lagged with waterproof wrapping to prevent formation of condensation.

Drinking water

101. Drinking water points served directly from the service pipe should be provided near the lavatory basins and also in the mess-room.

Hot water services

102. Improved techniques and new washing systems require less hot water at a lower temperature (140°F) than the older systems, and it may be convenient to take the supply from the hospital's hot water service, provided that it is consistently less than 4° Clarke's hardness. If an independent supply is provided, the use of condensate from the laundry's steam traps should be considered for heating the hot water, especially if the boiler house is remotely situated and requires long condensate return lines. When normal working is in progress the condensate from the laundry steam traps is generally ample for providing the heat for the laundry's hot water system by means of a storage type calorifier without the use of live steam make-up. But to cover the needs of starting up, a small thermostatically controlled live steam calorifier may be needed in conjunction with the main storage calorifier. Generally, gravity circulation should be satisfactory for the hot water service.

Condensate

103. The importance of efficient steam trapping and removal of air cannot be over-stressed. Branches supplying steam to the machines should be taken from the top of the steam main, and steam receivers should be trapped individually with the exception of the head and buck of the press, which may be trapped collectively. A system of condensate return by gravity discharge from the traps is generally preferable to a system using lifting traps. Condensate at the presses, supplied via small condensing units, may be used for damping articles as an alternative to atomised sprays using cold water and compressed air. (See paragraph 100.)

Compressed air

104. Compressed air is used extensively for presses, hoists, automatic controls for washing machines, etc., and cleaning points adjacent to machinery. The air compressors and receivers should be located in the calorifier and plant room and precautions taken to reduce any noise nuisance. The air intake should be placed in a dry position outside the building and fitted with a silencer. In order to ensure a full service the air compressor capacity should be divided into two units. They should be complete with all necessary fittings, including an automatic unloading device, controls and suitable drainage. Normal working pressure is from 80/100 p.s.i. and there should be sufficient capacity to serve all machines when the compressors are working steadily. Automatic oil and water vents must be fitted at the base of the air receiver with strainers and oil and water taps fitted on each drop leg serving the machines. Compressed air pipe lines should be laid to suitable falls and water drain points fitted for each machine or group of machines to ensure removal of water.

Town gas

105. The decision to use gas will depend on local needs and availability. The heat required for hand irons and collar polishing equipment formerly provided by high pressure gas is now so small in quantity that it can usually be provided more conveniently by electric power. A gas supply may be required to the water boiler, and hot cupboard, in the mess-room. The meter should be housed in a dry place.

Electrical installation

General

106. The electrical installation should include wiring and equipment for power, general and special lighting, heating, ventilation, socket outlets, telephones and clocks. Guidance on factors affecting the supply and distribution arrangements is available in Hospital Technical Memorandum No. 7, Electrical Services: Supply and Distribution.

107. The electrical supply should be 3 phase, 4 wire, 50 cycles/second, provided by either a sub-main circuit from the main intake and distribution centre or by a separate feeder from the main incoming sub-station to a switch-room centrally placed within the laundry (see paragraph 35). The switch-room will be required to house the sub-main switchboard, which will comprise: incoming mains isolator, distribution switch-fuses and fuse-boards, etc. Space should be allowed for 3 phase, 4 wire Kwh meter and maximum demand meter (with current transformers if required), or suitable connections left for testing with portable meters. Fuse-boards, isolators, starters, control gear and motors situated in the productive areas should generally be "weatherproof". For other internal areas the installation should follow normal practice.

108. Distribution fuse-boards should be centrally placed to minimise the length of circuit wiring. They should be reasonably accessible and fitted with locks. Space should also be allowed for future additional units. H.R.C. fuses are recommended and spare ways and fuses should be provided. Metal trunking and conduit with butyl rubber wiring is suitable for the power supply to the machines. Wherever possible, conduits and cables should be concealed. There are advantages in the use of the mineral insulated copper covered polyvinylchloride sheathed system in the productive area of the laundry.

Power

109. It is essential that all power machines should be adequately earthed in accordance with the current edition of the Regulations for the Electrical Equipment of Buildings (The Institution of Electrical Engineers). If each machine is not supplied with a combined isolator-starter, then a separate isolator with suitable identification will need to be fitted adjacent to it. All machines having a rating exceeding 15A. (running current) should have a separately fused circuit with fixed wiring and controls. Trailing control cables used in conjunction with overhead mono-rail hoist systems, etc., should be adequately insulated. For these systems the contactor-starters should be remotely operated by push-buttons. The starters should be complete with overload and earth-leakage protection. The voltage of the operating coil and control push-buttons should not exceed 50 volts A.C. All motors in the productive area and also those for the mechanical roof extract fans should be "weatherproof" and suitably protected against hosing down and splashing when placed at low level.

Artificial lighting

110. The following table gives recommended values of general illumination for various rooms measured at three feet above the floor level:

Accommodation	*Average lumens/ square foot recommended at working level*
Repair room for linen	25
Wash-area, calendering, drying and pressing, dry cleaning ...	20
Foul sluice room, reception and classifying, sorting, packing and despatch, main linen store, offices and infants' napkin section ...	
Engineers' stores	15
Mess-room and staff rest room, barrier rooms, corridors	10
Calorifier and plant room, switch room, water softening plant room, stores, lavatories and lockers ...	7

Lighting

111. An even distribution of lighting is desirable. All working areas, instrument panels and control positions should be well lit and free from glare. Lighting fittings in the productive area and external areas should be "weatherproof", non-corrosive, and have smooth external surfaces to facilitate maintenance and cleaning. Fluorescent fittings may be preferred, but it is essential that the lighting should give satisfactory colour rendering. Tungsten filament lighting is generally suitable for offices, mess-rooms, etc. Switches controlling the lighting in the working areas should be "weatherproof" and non-corrosive. Switching arrangements should give flexibility of control.

Socket outlets

112. 13 A. "off-standard" socket outlets for use in the productive area should be of the switched weatherproof, iron-clad, galvanised pattern (e.g. for use with industrial type vacuum cleaners and floor cleaners, etc.). Elsewhere 13 A. socket outlets of the switched, shuttered, universal type should be provided for the use of portable appliances (e.g. offices, mess-room, etc.).

113. The following socket outlet provision is suggested:

Finishing section	1 13 A. O/S outlet adjacent calender machines 1 13 A. O/S outlet adjacent presses
Reception, sorting and classifying room	1 13 A. O/S outlet for general use
Packing and despatch	1 twin 13 A. outlet for general use
Main linen store	1 twin 13 A. outlet for general use
Switch room	1 13 A. outlet for general use
Offices	1 twin 13 A. outlet
Mess-room	13 A. switched socket outlets to suit the number of appliances plus one for future requirements (outlets should include indicating lights)

Repair room for linen	13 A. outlets to suit number of machines
Engineers' store	1 twin 13 A. outlet
Corridors	13 A. outlets to be provided to allow for use of vacuum cleaner
Infants' napkin section (finishing side)	1 13 A. outlet for general use.

Telephones

114. Telephone facilities for internal and external calls will be required in the laundry manager's office. An inter-communication system may also be required between the wash area (soiled side) and sorting and classifying area and the offices.

Electric clocks

115. Synchronous electric clocks will be required in the laundry manager's office and at each end of the productive areas.

Radio/loudspeaker system

116. Provision should be made for a radio system in the laundry. It may be an extension from the main hospital system. The control unit can be located in either the laundry manager's or general office.

Fire alarms and fire fighting equipment

117. Pending the issue of the Hospital Technical Memorandum on Fire Precautions information on fire alarms and extinguishers is given in B.S. Codes of Practice and in H.M.(56)36 on Hospital Fire Precautions. Advice on the fire fighting installation proposed should be sought from the local fire authority. An automatic heat detector (flush-fitting type) should be fitted in the linen store, and wired to an indicator in the hospital telephone exchange.

Figures 3-7 inclusive

Legend

B.	Bin
B.P.	Barrier partition
B.R.F.	Barrier room, female
B.R.M.	Barrier room, male
C.F.	Cloaks, female
C.M.	Cloaks, male
C.H.L.	Conveyor, high level
C.P.M.	Collar polishing machine
C.P.R.	Calorifier and plant room
C.R.	Cleaners' room
C.T.T.	Conveyor, two tier
D.	Delivery
D.T.	Drying tumbler
E.S.	Engineers' stores
E.S.R.	Electrical switch-room
F.	Feed
F.W.I.M.	Flat-work ironing machine
F.W.P.	Flat-work preparer
F.W.S.	Flat-work " spreader "
G.H.	Gantry for hoist
H.EX.	Hydro-extractor
H.I.	Hand ironing
H.W.R.S.	Heat and water recovery system
M.C.S.	Machine clothing store
M.R.	Mess-room
M.F.	Mechanical folder
M.S.	Mechanical sluicer
M.L.S.	Main linen store
O.A.L.M.	Office, assistant laundry manager
O.G.	Office, general
O.L.M.	Office, laundry manager
P.	Press
R.R.	Rest room
S.D.M.	Static drying machine
S.M.	Starching machine
S.O.T.	" Shaking out " tumbler
T.	Table
T.F.	Toilet, female
W.M.	Washing machine (loaded from the reception (soiled) side of the barrier partition; unloaded from the despatch (clean) side
W.M.S.	Washing materials store
W.M.S.T.	Washing materials solution tanks
W.S.P.	Water softening plant

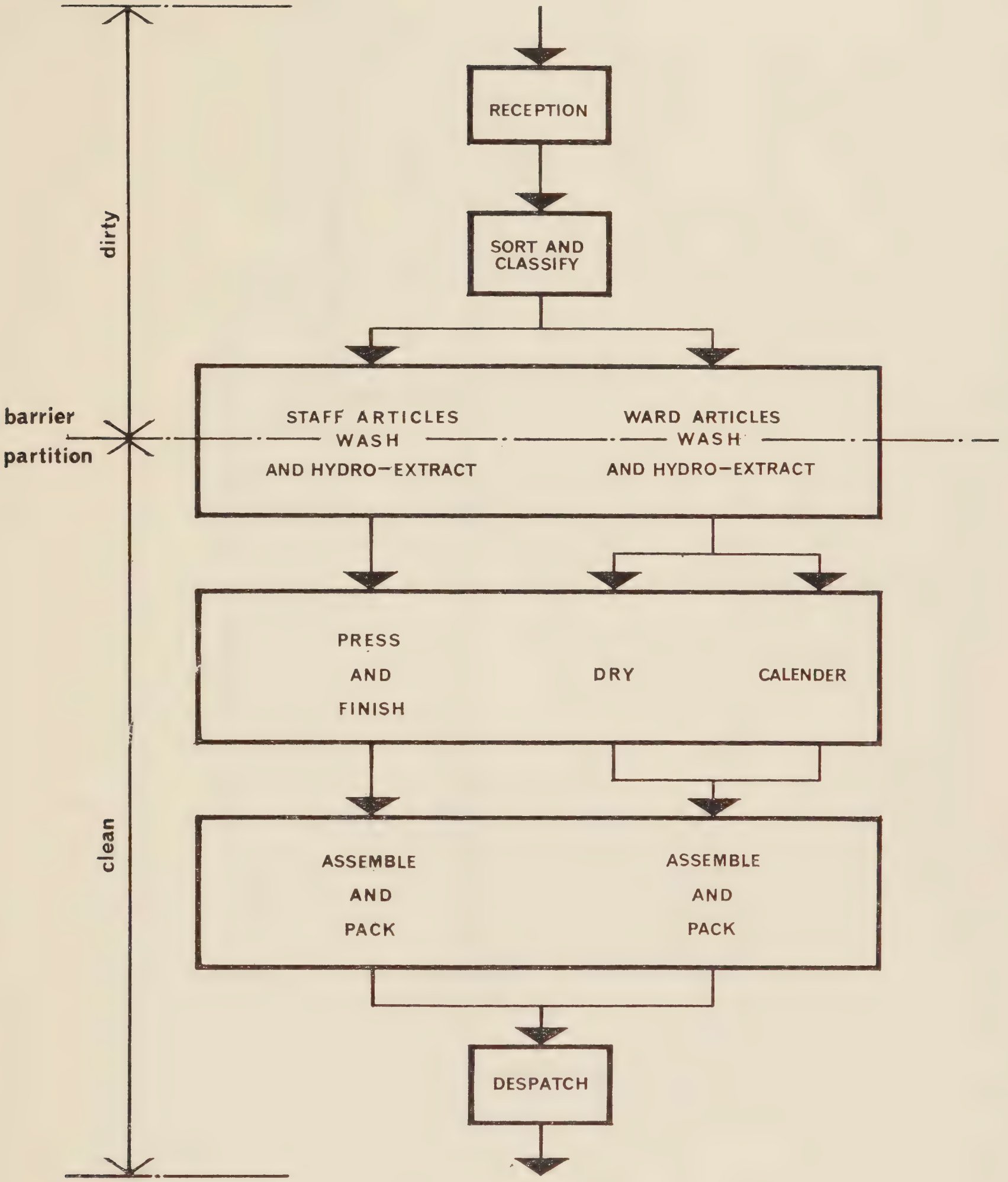

FIGURE 1. Work flow diagram.

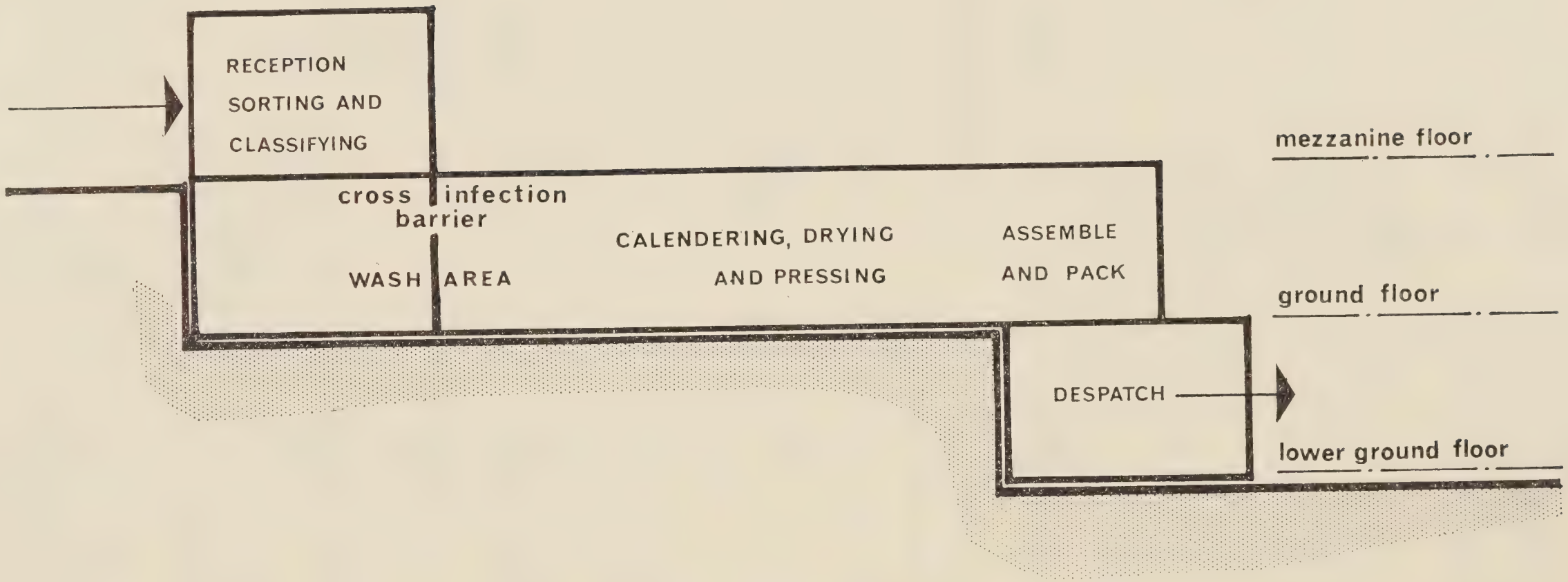

FIGURE 2. Section-mezzanine floor arrangement.

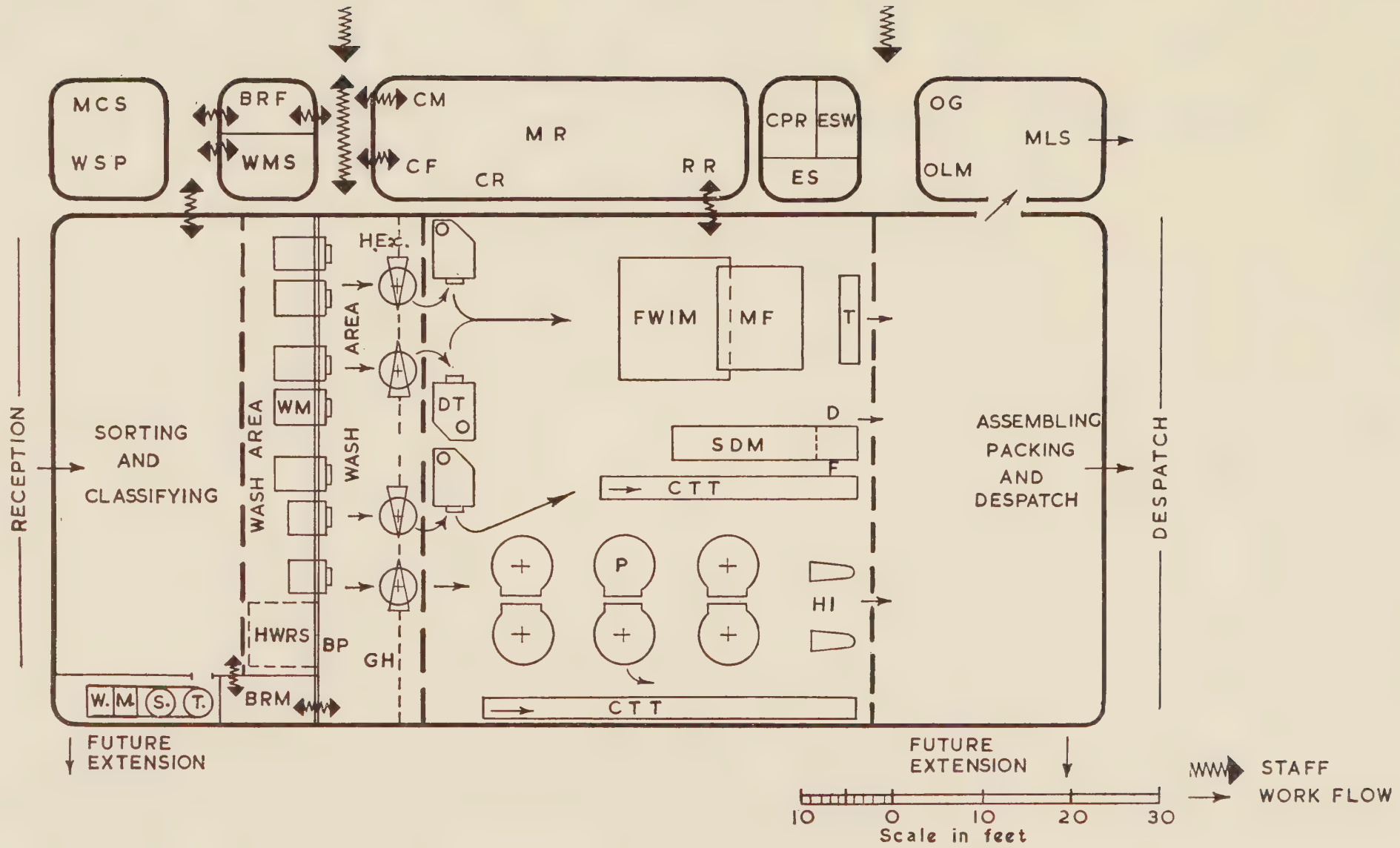

FIGURE 3. Laundry—45,000 articles (·7 lb. per article) weekly.

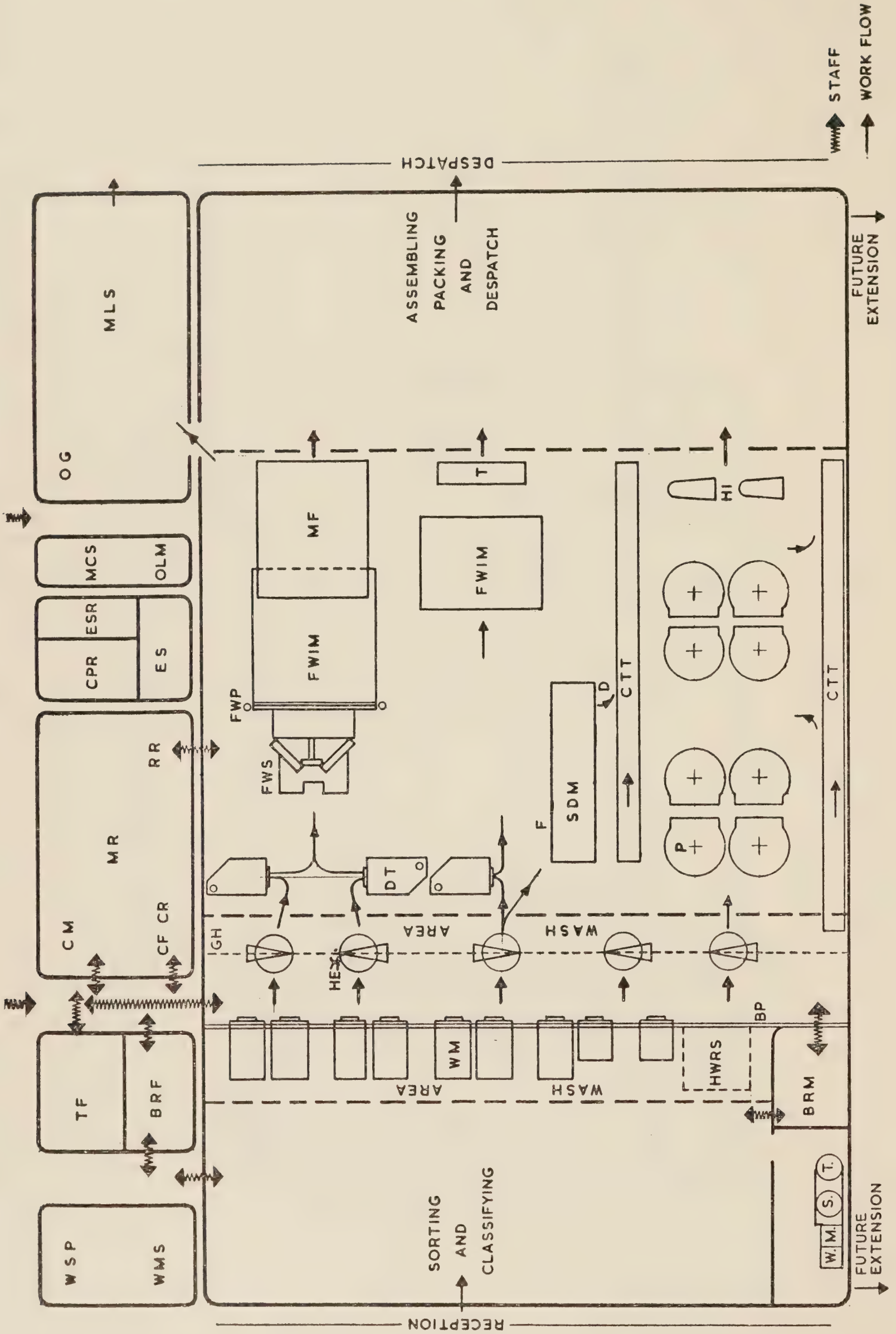

FIGURE 4. Laundry—60,000 articles (·7 lb. per article) weekly.

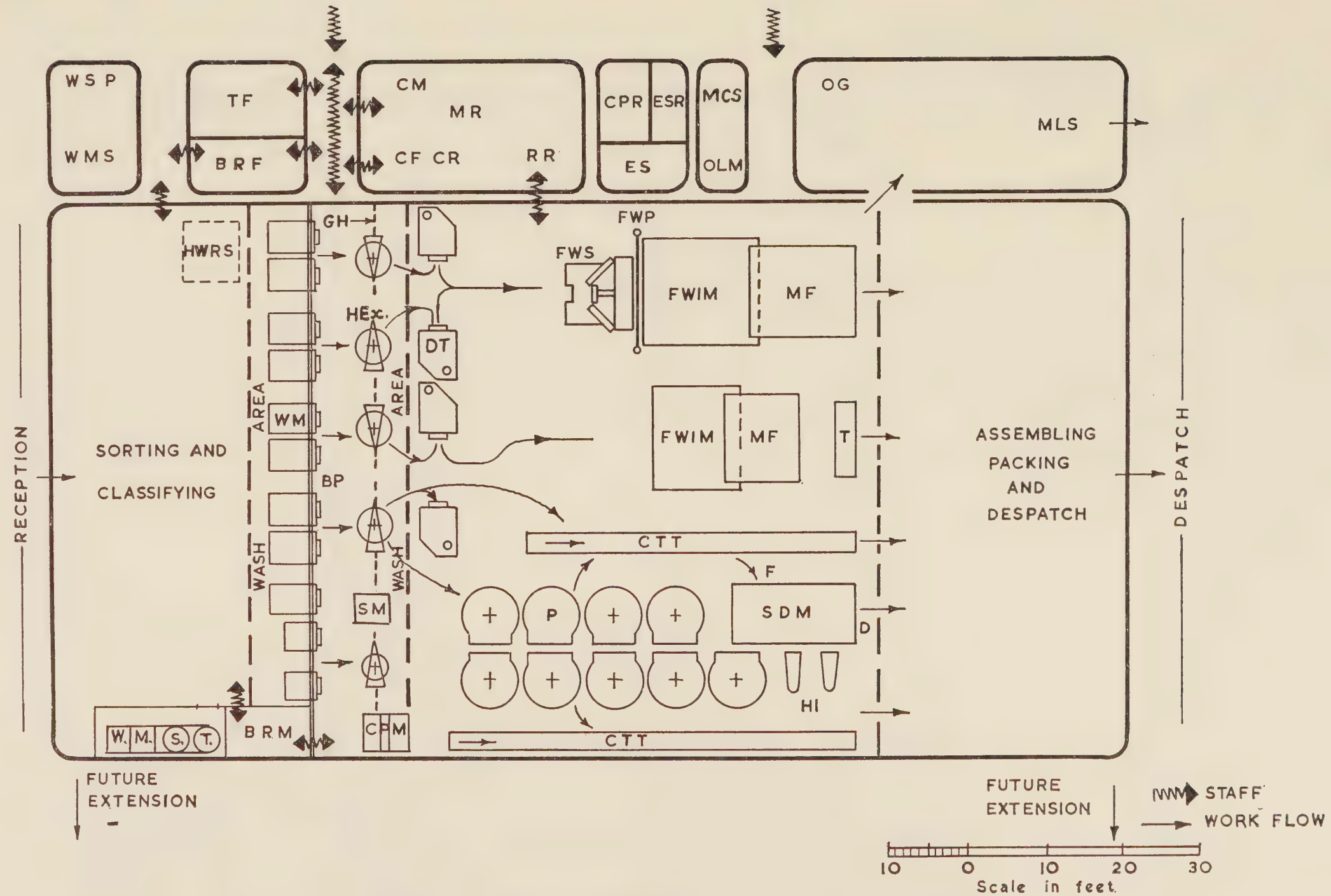

FIGURE 5. Laundry—75,000 articles (·7 lb. per article) weekly.

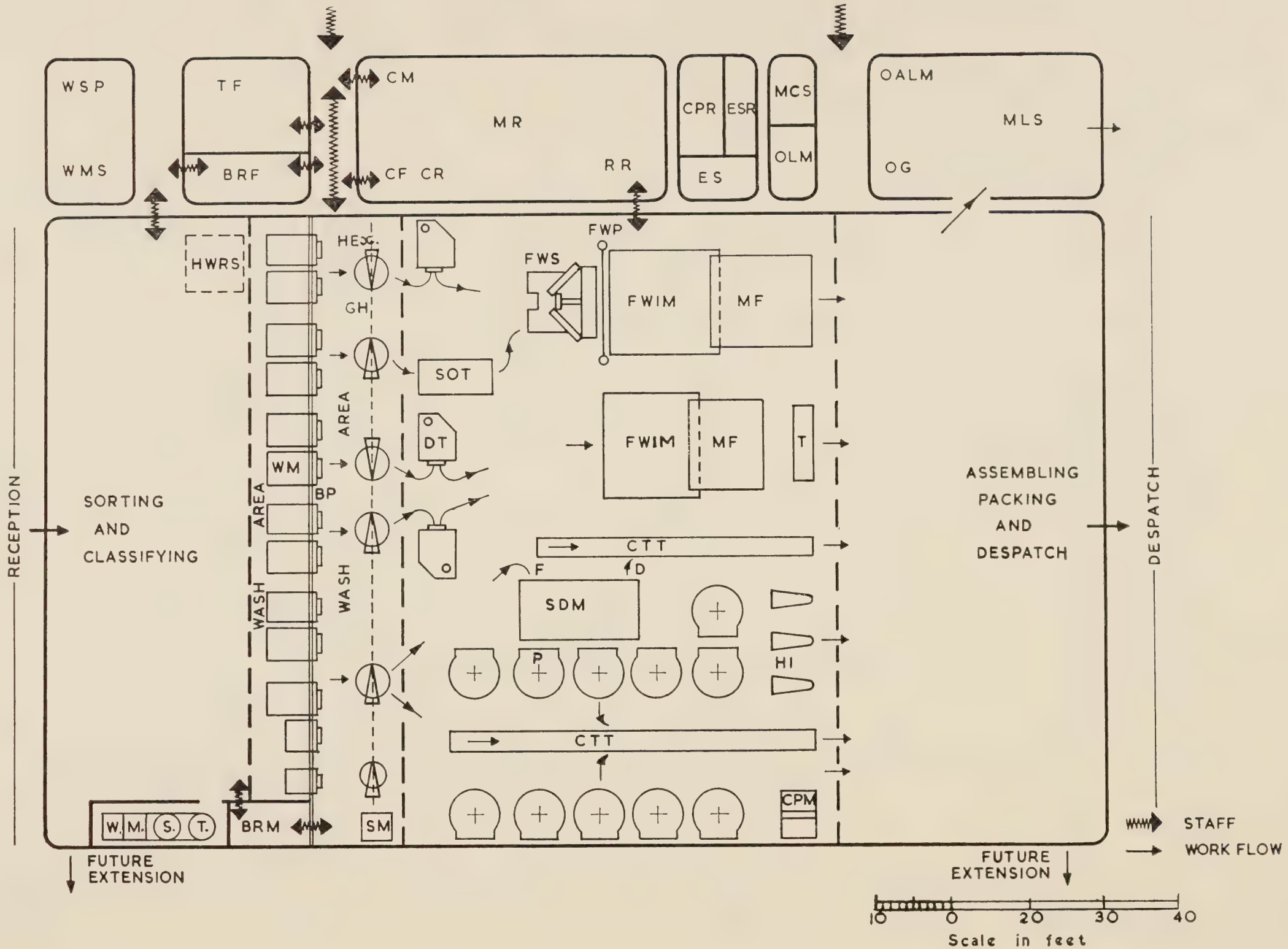

FIGURE 6. Laundry—90,000 articles (·7 lb. per article) weekly.

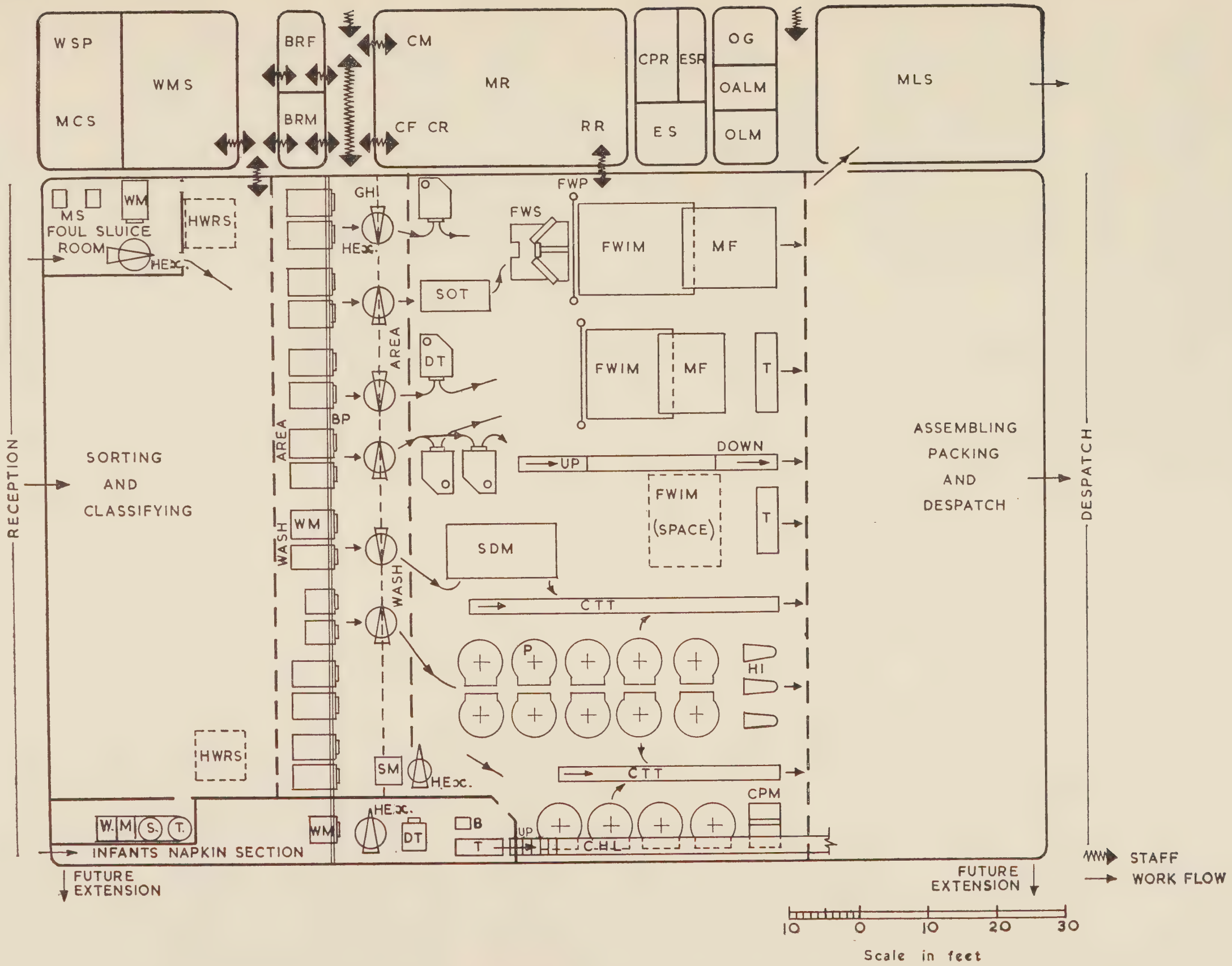

FIGURE 7. Laundry—110,000 articles (·7 lb. per article) weekly.

APPENDIX I

ACCOMMODATION

The following is a guide to the accommodation required; modifications may need to be made to the areas of the main accommodation A(a) in the light of the precise requirements, including the type of plant selected.

Laundry capacity (Articles weekly, 0·7 lb. per article)	45,000	60,000	75,000	90,000	110,000
Wash-area capacity (Dry weight weekly—lbs.) ..	31,500	42,000	52,500	63,000	77,000
	Areas in square feet				
A. Basic accommodation					
(*a*) Productive area*					
Reception, sorting and classifying	1,125	1,500	1,875	2,250	2,750
Wash area	1,190	1,480	1,480	1,785	2,105
Calendering, drying, pressing	2,850	3,890	4,175	4,870	5,925
Assembling, packing and despatch	1,500	2,000	2,500	3,000	3,700
Sub-totals	6,665	8,870	10,030	11,905	14,480
(*b*) Staff lavatories and changing rooms:					
female					
male					
(*c*) Barrier rooms:					
female	65	65	85	90	100
male	65	75	75	100	100
(*d*) Mess-room	250	320	400	460	550
(*e*) Rest room	60	60	60	90	90
(*f*) Offices	135	180	215	250	300
(*g*) Laundry stores:					
Washing materials store	100	120	125	160	215
Machine clothing store	55	55	60	65	80
(*h*) Electrical switch-room	40	40	50	50	50
(*i*) Calorifier and plant room	100	100	120	150	150
(*j*) Cleaners room	50	50	50	50	50
(*k*) Circulation space for (*b*) to (*j*)					
(*l*) Header tank storage (1 hour)	120	150	200	225	275
B. Additional accommodation*					
(*a*) Foul sluice room	–	–	–	–	315
(*b*) Infants' napkin section	–	–	–	–	660
(*c*) Main linen store	[See Paragraph 47]				
(*d*) Repair room for linen	65	100	100	150	150
(*e*) Water softening plant	80	80	80	100	100
†Soft water storage (4 hours)	240	300	400	450	550
Dry salt store	80	80	80	80	80
or					
†Slurry salt store	100	100	100	100	100
(*f*) Engineers' store	60	60	80	80	100
(*g*) Dry cleaning room	–	–	–	–	350

*Circulation space included in areas given.

†May be outside building.

APPENDIX II

MAIN LAUNDRY PLANT—SCHEDULE

The following is a guide to the main items of plant required; modifications may be needed in the light of the particular type of plant and equipment selected and the weight and make-up of the work.

Laundry capacity (Articles weekly 0·7 lb. per article)	45,000	60,000	75,000	90,000	110,000
Wash-area capacity (Dry weight weekly—lbs.) ..	31,500	42,000	52,500	63,000	77,000
Washing machines:					
100 lb.	5	7	9	11	14
50 lb.	1	1	1	1	1
25 lb.	1	1	1	1	1
Hydro-extractors: :					
36 in. (100 lb.)	3	4	4	5	6
21 in. (25 lb.)	1	1	1	1	1
Flat-work ironing machines					
(18 in. × 120 in./126 in.)	4-roll	5-roll	5-roll	5-roll	6-roll
	–	3-roll	3-roll	4-roll	4-roll
Folding equipment:					
Without cross fold for small articles	1	–	–	–	–
With cross fold for small articles	–	–	1	1	1
With cross fold for small and large articles ..	–	1	1	1	1
Calender preparing equipment:					
"Spreader" for large flat work	–	1	1	1	1
Suction preparing equipment for large flat work ..	–	1	1	1	2
Presses	6	8	9	11	14
Static drying machines:					
Capacity 200 lb. per hour	1	1	–	–	–
Capacity 350 lb. per hour	–	–	1	1	1
Tumblers—preparing:					
"Shaking out", or conditioning	–	–	–	1	1
Orthodox type (35/48 cu. ft. capacity)	2	2	2	–	–
Tumblers—complete drying:					
Orthodox type (35/48 cu. ft. capacity)	1(1)	1(2)	2(2)	3(2)	4(2)
Starching machine (for collars)	–	–	–	1	1
Collar polishing machine	–	–	–	1	1

Other equipment: Weighing facilities, automatic controls for the washing machines, and for starch injection, steam/air finisher, pillow-slip press, conveyors—mono-rail and flat belt—racks for clean linen, mechanical sluicers, air compressors, etc.

APPENDIX II (continued)

NOTES

1. Washing machines—for woollens, the 2-speed drive type of machine equipped with interrupter gear will be required.

2. Flat-work ironers (calenders)—18 ins. × 120/126 ins. deep-bed machine with suction and spring padding (or equally suitable machines with similar output).

3. Folding equipment—that specified is capable of making the $\frac{1}{2}$ and $\frac{1}{4}$ folds in both large and small articles together with cross-folding where indicated.

4. Presses—" rotating table " type, or equally suitable presses of different type.

5. Static drying machine—if it is the intention not to use this type of equipment, additional drying tumblers of the 2-speed type will be required. The additional drying tumblers are shown in brackets against " Tumblers—complete drying ".

6. The machines specified under " Tumblers " are those generally in use and serve as a guide to capacity. Self-loading and unloading tumblers are generally higher in capital cost but have advantages in lower running costs. In certain circumstances they are more economical in floor space, a large capacity machine requiring little more area than a tumbler of normal capacity.

7. The above items are specified in " Laundry plant —specification ". (Section V, paragraphs 57–80.)

APPENDIX III

SERVICE REQUIREMENTS

The following table indicates maximum consumptions to be assumed for the laundries of five different capacities (45,000 to 110,000 articles weekly), the equipment for which is specified in Appendix II. The final estimates should be made to suit the particular type of equipment selected, the washing methods employed, and the weight and make-up of the work.

Laundry capacity (articles weekly, 0·7 lb. per article)	45,000	60,000	75,000	90,000	110,000
Wash-area capacity (dry weight weekly—lbs.) ..	31,500	42,000	52,500	63,000	77,000
Steam:					
Approx. hourly consumption (lb.)					
High pressure	2,200	2,800	3,600	4,300	5,300
Low pressure: 200° F. wash	1,200	1,600	2,000	2,400	2,900
Low pressure: 160° F. wash	870	1,160	1,440	1,730	2,120
Approx. low pressure flow (lb. per minute) ..	26	34	39	47	68
Water:					
Approx. total max. hourly consumption (gallons)—cold 85 per cent; hot 15 per cent	2,800	3,700	4,600	5,600	6,800
Maximum cold water flow (gallons per minute) ..	130	170	195	235	340
Electricity approx. Power (excluding mechanical ventilation and conveyors)—Kw	35	45	55	65	80

NOTES

1. The drainage system should be designed to deal with the effluent from all machines without the risk of floor flooding.

The effluent flow is usually assumed to be between two and three times the rate of flow of the cold water supplied to the machines. When the washing machine sumps have to cope with a heavy flush of effluent due to simultaneous discharge the higher flow rate (three times) should be taken for design purposes.

The effluent from the laundry may be run into an existing hospital drainage system, it is therefore important that in the case of a new or enlarged laundry the total capacity of the drainage system should be carefully considered.

The formation of a certain amount of lint during washing is unavoidable and this is discharged with the effluent. In order to avoid the possibility of the lint and other waste matter obstructing the drains a sump, complete with strainer between the discharge from the wash area and the drains, should be provided. The strainer should be designed for convenient access and easy removal of waste matter.

2. The low pressure steam consumption shown is based on a maximum temperature for the washing process of not less than 200° F.; for lightly soiled work a temperature of 160° F. may be employed with consequent reduced low pressure steam consumption. This lower temperature is sufficient to ensure that all vegetative organisms are killed provided the temperature is maintained throughout the load. Where heavy machine loadings are employed (5 lbs. or more per cubic foot) it will be necessary to prolong the washing process at 160° F. to compensate for the time lag in reaching the temperature at the centre of the load.

3. The low pressure steam indicated above and the water requirements will be reduced by approximately 50% if the washing machines form part of a heat and water reclamation unit.

4. Steam for the hot water service is included but not steam for space heating.

5. Supplies of both high pressure and low pressure steam will be required. High pressure steam (for finishing and drying plant) should be at a pressure of not less than 100 p.s.i.g. The low pressure steam supply (for washing machines) will not need to exceed 30 p.s.i.g. unless a higher pressure is recommended by the manufacturers for specialised plant.

6. An increase in the low pressure steam flow and the maximum cold water flow shown will generally be necessary if, instead of sequence control, manual operation is employed.

Ministry of Health

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